

What is claimed is:

- 1 1. An electronic structure comprising  
2 a substrate having a dielectric layer having a via opening therein; having sidewalls  
3 and bottom surfaces;  
4 a barrier layer deposited on the sidewalls and bottom surfaces of the via opening;  
5 and copper electrodeposited from a bath having a pH of about 12.89 or greater on the barrier  
6 layer on the sidewalls and bottom surfaces of the via opening..
- 1 2. The structure of claim 1 wherein the thickness of the copper is about 10 nanometers  
2 to about 100 nanometers.
- 1 3. The structure of claim 1 wherein the thickness of the copper is about 20 to about 50  
2 nanometers.
- 1 4. The structure of claim 1 wherein the barrier layer is selected from the group  
2 consisting of tungsten, titanium, tantalum, nitrides thereof, silicon nitrides thereof and alloys  
3 thereof.
- 1 5. The structure of claim 1 wherein the barrier layer having thickness of at least about 4  
2 nanometers.
- 1 6. The structure of claim 1 wherein the dielectric layer comprises silicon dioxide.
- 1 7. The structure of claim 1 wherein the via opening has an aspect ratio of greater than  
2 3:1.
- 1 8. The structure of claim 1 wherein the barrier layer comprises tungsten.
- 1 9. The structure of claim 1 wherein a free of a seed layer between the barrier layer and  
2 copper.



- 1 10. A method of fabricating an electronic structure which comprises forming an  
2 insulating material on a substrate; lithographically defining and forming recesses for lines  
3 and/or via having sidewalls and bottom surface in the insulating material in which  
4 interconnection conductor material will be deposited;  
5 depositing a barrier layer on sidewalls and bottom surfaces of the recesses;  
6 depositing copper on the barrier layer by electroplating from a bath having a pH of  
7 about 12.89 or greater, a source of cupric ions and a complexing agent and at a current  
8 density of about 5 to about 25 $\mu$ A/cm<sup>2</sup>.
- 1 11. The method of claim 10 wherein the copper is deposited to provide a thickness of  
2 about 10 nanometers to about 100 nanometers.
- 1 12. The method of claim 10 wherein the copper is deposited to provide a thickness of  
2 about 20 to about 50 nanometers.
- 1 13. The method of claim 10 wherein the barrier layer is selected from the group  
2 consisting of tungsten, alloys of tungsten, titanium, alloys of titanium, titanium nitride,  
3 tantalum, tantalum nitride and tantalum silicon nitride.
- 1 14. The method of claim 10 wherein the barrier layer has a thickness of at least about 4  
2 nanometers.
- 1 15. The method of claim 10 wherein the barrier layer is tungsten.
- 1 16. The method of claim 10 wherein the dielectric is silicon dioxide.
- 1 17. The method of claim 10 wherein the recess has an aspect ratio of greater than 3:1.
- 1 18. The method of claim 10 wherein the electroplating bath is at a room temperature of  
2 about 22° C.



- 1 19. The method of claim 10 wherein the source of cupric ions is  $\text{CuSO}_4$ , and the  
2 complexing agent is EDTA or salt of thereof.
- 1 20. The method of claim 19 wherein the electroplating bath comprises sodium  
2 hydroxide or potassium hydroxide.
- 1 21. The method of claim 10 wherein the electroplating bath further comprises a  
2 stabilizer and surfactant.
- 1 22. The method of claim 21 wherein the stabilizer is 2,2' -bipyridyl.
- 1 23. The method of claim 10 wherein the plating bath further comprises cyanide ions.
- 1 24. An aqueous copper plating bath comprising a source of cupric ions and a  
2 complexing agent, having pH at least 12.89 and a deposition rate of at least  $15 \mu\text{A}/\text{cm}^2$ .
- 1 25. The plating bath of claim 24, wherein the source of cupric ions is  $\text{CuSO}_4$  and the  
2 complexing agent is EDTA or salt of thereof.
- 1 26. The plating bath of claim 24 which further comprises sodium hydroxide.
- 1 27. The method of claim 25 wherein the electroplating bath further comprises a  
2 stabilizer and surfactant.
- 1 28. The structure obtained by the method of claim 10.

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